

# ANALYSIS AND ASSESSMENT FOR LEAN CONSTRUCTION ADOPTION: THE DOLC TOOL

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## 1 INTRODUCTION.

Lean Construction (LC) is a theory-based methodology for construction (Koskela et al 2002). Projects are temporary production systems (Ballard and Howell 2003) and Lean Construction is a way of designing systems to minimize waste and generate maximum value (Ballard and Howell 2003; Koskela et al 2002). The concept emphasizes waste elimination throughout activities and operations without compromising the client's value (Liker 2005). By implementing LC in projects, clients may improve their project delivery regarding cost, quality and time.

This paper presents the conclusions of a survey of Lean Construction use, which was applied in Brazil. The survey was developed by gathering a compilation of 10 (ten) papers that have all used analysis and assessment tools of Lean Construction application in 35 (thirty-five) construction companies in Brazil, using in a tool called DOLC (Degree of Lean Construction).

## 2 DOLC - DEGREE OF LEAN CONSTRUCTION

The proposed model of analysis and assessment, here called DOLC, diagnoses the current state of a construction company in relation to the level of implementation of concepts of lean construction that this company has established (Carvalho 2008).

The DOLC will indicate which of the key points of the lean philosophy that the construction company has applied more prominently and which key points the constructor has a less expressive performance. This way, opportunities are created to identify, classify and improve lean performance in construction companies (Carvalho 2008).

The DOLC tool was based on the 11 principles elaborated by Koskela (1992) and the goal of the DOLC tool is to point out difficulties found by researchers and contractors in establishing a methodology for the implementation of the Lean Construction philosophy, for those contractors who desire to engage in this production philosophy.

The DOLC is divided into five (5) questionnaires and they must all be answered by at least one person representing each of the categories of stakeholders: directors, engineers, construction workers, suppliers and designers. The tool can be applied to any contractor, regardless of whether they apply the Lean Construction philosophy or not.

## 3 RESULTS, METHODOLOGY AND ANALYSIS

The classification among the 35 analyzed cases, from the years 2008 to 2016, presents consistent results that indicate the performance criteria as presented in table 1.

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Table 1 - DOLC classification of 35 Brazilian companies (10 papers DOLC results).

LEVEL	SUB LEVEL	GRADE	COMPANIES RESULTS	DOLC CLASSIFICATION
A	AAA	95% to 100%		VERY GOOD LEVEL OF LEAN CONSTRUCTION
	AA	90% to 94%		
	A	85% to 89%		
B	BBB	80% to 84%	1	GOOD LEVEL OF LEAN CONSTRUCTION
	BB	75% to 79%	6	
	B	70% to 74%	4	
C	CCC	65% to 69%	9	LOW LEVEL OF LEAN CONSTRUCTION
	CC	60% to 64%	3	
	C	55% to 59%	4	
D	DDD	50% to 54%	1	NO USE OF LEAN CONSTRUCTION
	DD	45% to 49%	2	
	D	0% to 44%	5	
		TOTAL	35	

The 35 case studies were compiled in figure 1 to demonstrate the situation of the 11 principles proposed by Koskela (1992). It is possible to identify the need and a way for the Brazilian construction industry to develop proposals and actions in favor of Lean Construction, therefore, valuing this important sector of the Brazilian economy and, with that, collaborating with aspects of economic and environmental development.

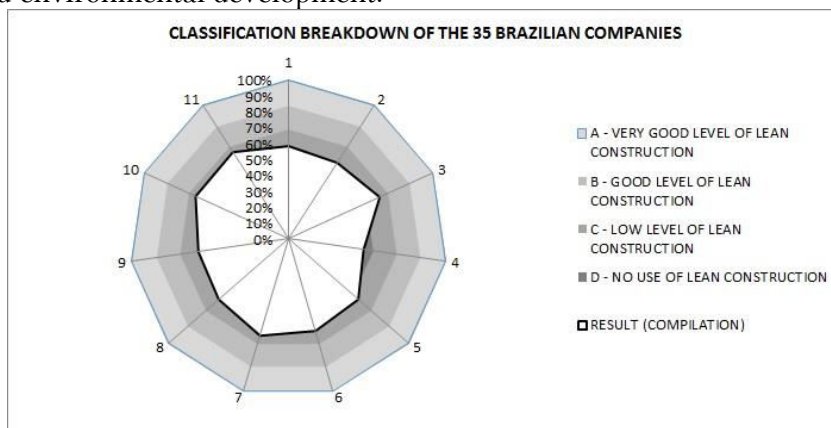


Figure 1 - Classification breakdown of the 35 Brazilian companies, around the 11 Principles of Lean Construction

It is worth nothing that item 04, which relates to “reducing the cycle time”, among the 11 fundamental principles of Lean Construction, is the least developed with performance of only 48% of the average among the companies analyzed.

## 4 CONCLUSIONS

This study shows that Brazilian companies are poorly aware of Lean Construction and are using few lean construction practices. The actions that promote Lean Construction among Brazilian contractors are not being efficient enough to leverage the country as a benchmark in Lean Construction. These results corroborate the low productivity indexes of the Brazilian construction industry.

To change this scenario, a joint action is proposed among class entities, the civil construction companies, and academic circles. Actions directed to the market are key to raising the understanding of Lean Construction and its benefits, in order to obtain better performance of the construction companies in the future.

It is recommended that this study be performed again at a future opportunity to compare the results obtained with the current results demonstrated in this paper, to assess whether actions of continuous improvement have been present in the Brazilian market.



